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Accuracy of current transformers (CTs) used in medium-voltage control equipment

In specifications for medium-voltage motor control equipment, purchasers sometimes specify high relay accuracy ratings for the current transformers (CTs). While high relay accuracy ratings are frequently necessary for circuit breaker applications, high accuracy for CTs in medium-voltage motor control equipment is seldom needed for the application.

In circuit breaker applications, there is a need for accuracy at relatively high levels of short-circuit current, and if the protective relays are located remotely from the circuit breaker (and its CTs), the secondary circuit will have appreciable burden. This is a common consideration for outdoor circuit breakers, or for circuit breakers in metal-clad switchgear used with remote transformer differential relays.

The situation in medium-voltage motor control equipment is quite different. In NEMA Class E2 control, current interruption is performed by the vacuum contactor for load currents, during starting and for moderate overload currents. However, interruption of short-circuit currents is accomplished by current-limiting fuses. Class R fuses are used for motor starting applications, and Class E fuses are used for protection of transformers and non-motor loads. The coordination of the fuse time-current characteristic and the vacuum contactor (and its overload protective relay) is designed so that the current-limiting fuse will interrupt first for all currents above approximately eight to 12 times the full load current of the motor.

Since the current-limiting fuse performs the interruption for short-circuit currents, the CTs do not need to have great accuracy for such currents. As a practical matter, the CT does not have to provide for accurate sensing of currents above the motor locked-rotor current.

For most applications, the CTs provided with SIMOVAC and SIMOVAC-AR medium-voltage control equipment have a relaying accuracy of C10. The overload protective relays used with today's controllers are low burden devices, and the length of wire in the CT circuit is small, so the burden of the wiring is small. Therefore, the standard C10 accuracy is satisfactory.

While Siemens can provide higher accuracies (e.g., C20 or C50) for many CT ratios, the extra cost of the higher accuracy seldom conveys an economic benefit

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